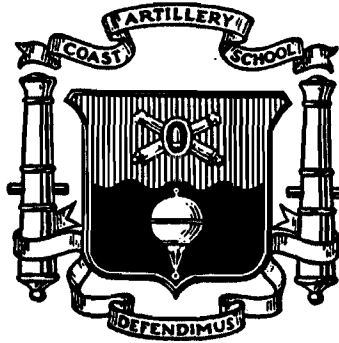


Capt Baker
RESTRICTED

COAST ARTILLERY TRAINING BULLETIN



(Tentative Field Manual, FM 4-91)

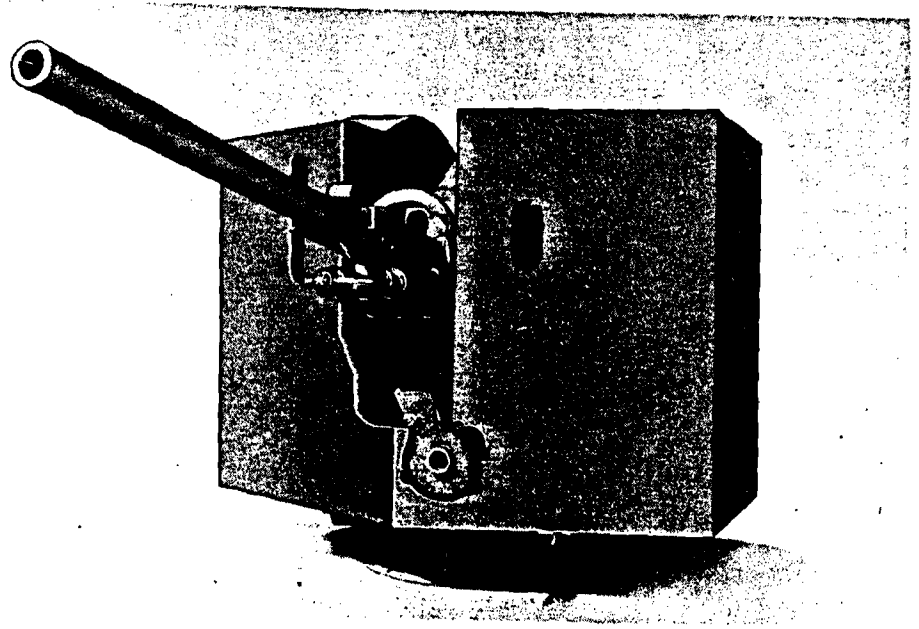
**90-MM GUN, FIXED MOUNT
SERVICE OF THE PIECE**

VOL. 2 No. 16

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With the approval of
THE COMMANDING GENERAL, ARMY GROUND FORCES



SERVICE OF THE PIECE 90-MM GUN, FIXED MOUNT

SECTION I

GENERAL

1. SCOPE.—This training bulletin prescribes the service of the piece for the 90-mm gun M1 on 90-mm gun mount M3. The battery commander should use this service of the piece as a guide. Variations in local conditions may necessitate certain changes in the methods described herein.

2. REFERENCES.—This training bulletin will not explain the details of the gun, top carriage, and remote control system, since this information is contained in the following manuals:

FM 4-126 Antiaircraft Artillery, Service of the Piece, 90-mm
Antiaircraft Gun.

TM 9-373 90-mm Gun M1 and 90-mm Gun Mount T3.*

SECTION II

MATERIEL

3. CHARACTERISTICS.—This weapon consists of the 90-mm gun M1 and top carriage M1A1 on the 90-mm gun mount M3. The mount M3 is of the turret type, the shielding being constructed of boiler plates. This boiler plate shield provides fragmentation protection only. No shielding is provided at the rear due to the requirements for service of the piece. A sighting port in the shielding in front permits sighting in direction by the gun pointer. The upper part of the opening provided for the movement of the gun in elevation and depression is protected with a sliding shield attached to the cradle. This shield slides back over the main shield as the gun is elevated. The mount allows 360° traverse and is capable of elevating from -8° to $+80^{\circ}$; however, it is not contemplated firing above $+15^{\circ}$. The maximum effective range of the gun is approximately 8,000 yards. The gun data computer, which is eventually to be supplied as part of the standard fire control equipment for this gun, provides for operation up to 12,000 yards. This provision permits tracking

* The 90-mm gun mount has been standardized as M3.

considerably in advance of the time when fire can be brought to bear on the target. The sighting equipment for case II pointing includes an elbow telescope M6 which has a power of 8 and a field of view of $8^{\circ}45'$. The telescope mount affords deflection settings of plus or minus 7° with 10 as the normal reading. The remote control system M13 is used. The K factor for target practice is 2.4 seconds, giving an expected rate of fire of 25 rounds per minute.

4. AMMUNITION.—a. The ammunition now provided is high explosive shell M71 with point-detonating fuze M48 and booster M20. (See fig. 1.) The ammunition comes sealed in a fiber container and is complete with booster and fuze. This fuze contains two actions, superquick and delay. Although both actions are initiated on

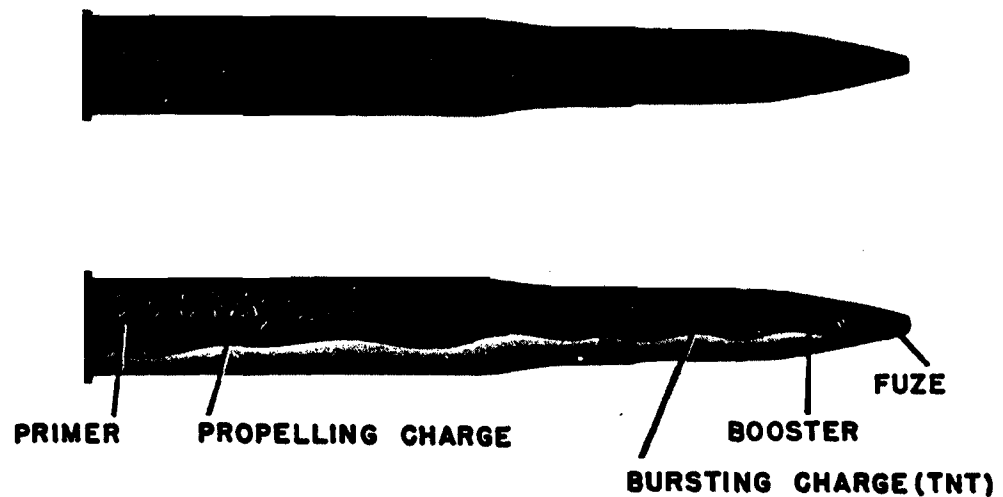


FIGURE 1.—Shell, fixed, HE, M71 with Fuze, PD, M48.

impact, the functioning of the shell depends on the setting of the fuze. However, it should be noted that if the fuze is set for superquick action, and this action fails, the projectile will function with delay action rather than become a dud. On the side of the fuze, near the base, are a slotted setting sleeve and two registration lines. The line parallel to the axis of the fuze is marked SQ (superquick); the other at right angles thereto is marked DELAY. As shipped, the fuze is set SQ. To set the fuze for delay action it is necessary to turn the setting sleeve so that the slot is alined with DELAY. A delay pellet, incorporated in the delay-action train, provides for the delay action. The setting may be made or changed at will with a screwdriver or similar tool at any time before firing. This can be done even in the dark by noting the position of the slot—parallel to the fuze axis for SQ and at right angles thereto for DELAY.

b. Normally the bulk of the ammunition will be stored in the battery emplacement. The ammunition is shipped in wooden boxes with four rounds to a box. One end of each box, held in place by a wing nut screwed on a bolt, is removable. A seal must be removed before the wing nut can be unscrewed. Under the wooden cover is a fiber board which must be pulled out before the four fiber containers, each containing a round of ammunition, can be removed. Each container cap is sealed to the container with tape which must be pulled off before the cap can be taken off. The fuze on each round should be set for delay action as soon as the round is taken from the fiber container. Alert ammunition is stored at each gun emplacement in a concrete boxlike shelter called an ammunition pit. (See fig. 2.) The ammunition in this pit should always be kept ready for immediate use with the fuzes set for delay action. (Firing the ammunition with the fuze set for delay action is recommended since there is a possibility then of obtaining ricochet air bursts which increase the probability of damaging the target.)

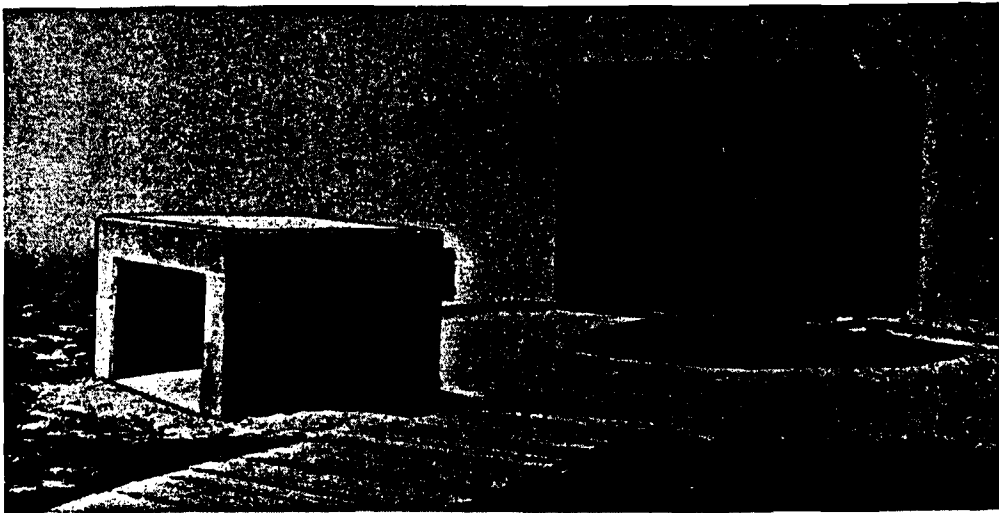


FIGURE 2.—Ammunition pit.

SECTION III

ORGANIZATION

5. GUN SECTION.—The gun section of the 90-mm gun, fixed mount, is composed of 15 men: 9 men in the gun squad, 6 men in the ammunition squad. The gun commander and chief of breech are included in the gun squad, and the chief of ammunition and basic are included in the ammunition squad. One artillery mechanic is assigned to the battery and is part of the machine gun and executive officer's detail.

6. GUN SQUAD.—The gun squad consists of a gun commander; chief of breech; No. 1 (elevation setter); No. 2 (gun pointer); No. 3 (loader); Nos. 4, 5, 6 (ammunition relayers); and No. 7 (empty cartridge handler).

7. AMMUNITION SQUAD.—The ammunition squad consists of a chief of ammunition, Nos. 8, 9, 10, 11 (ammunition handlers), and one basic, who works with the squad when his services are not needed elsewhere.

8. FORMATION OF GUN SECTION.—The gun section assembles in two ranks with four inches between files and forty inches between ranks, with even-numbered men in the front rank and odd-numbered men in the rear rank. (See fig. 3.) The front rank forms about one-half pace from the gun with the chief of breech behind the gun. After forming the section the gun commander takes post in the front rank, one pace to the right of his section.

SECTION IV

DUTIES OF PERSONNEL

9. GENERAL.—a. The battery executive, the gun commander, and the chief of ammunition have the same responsibilities and duties as are prescribed for the 90-mm antiaircraft gun. (See FM 4-126.) In addition, the battery executive and gun commander have the responsibility of conducting twice daily, morning and evening, an inspection of the gun and servicing equipment. At these times the gun commander will form his section and give the commands: DETAILS, POSTS and EXAMINE GUN. In going into combat it is not necessary to go through these commands. The sounding of the alert signal is sufficient to post the details. The gun commander can verify his details, especially at night, by the command CALL OFF and can check their readiness for action by the command REPORT.

b. Details, posts.—At the command DETAILS, POSTS, No. 1 (the elevation setter) and No. 2 (the gun pointer) enter the enclosure formed by the shield and take their positions opposite their respective indicator-regulators. The chief of breech and No. 3 (the loader) follow No. 1 and No. 2 respectively, taking posts at the breech, No. 3 on the left and the chief of breech on the right. Nos. 4, 5, and 6 (the relay men) and No. 7 (the empty cartridge handler) take position, as is shown in figure 4, ready to serve the gun. The ammunition squad forms just behind the ammunition pit. Servicing

equipment is kept convenient to the individual posts and it is only necessary for members of the gun section to check the items for presence and place them for use.

c. *Examine gun.*—(The following duties should be performed twice daily, morning and evening, to insure instant readiness for combat. Time cannot be taken when preparing for combat to perform these inspections.) At the command EXAMINE GUN:

(1) *Duties of No. 1 (the elevation setter) and No. 2 (the gun pointer).*—No. 1 manually elevates and depresses the gun to check smoothness of operation. No. 2 manually traverses the gun each way to check smoothness of operation. He also examines the telescope and telescope mount and checks the orientation. No. 1 and No. 2 check to see that the remote control system is working properly (described below). They check to see that the lag meters are zeroed; this must be done before the power is turned on. If the pointer on either lag meter is not directly over the white mark in the center of the dial, No. 1 or No. 2 reaches to the left side of his indicator-regulator, pulls out on the pin, and lifts the sliding cover. He then unscrews the cover of the lag meter adjusting shaft (1, fig. 5) and sets the pointer to the proper position by turning the slotted shaft with a screwdriver.

CAUTION: Turning the slotted shaft too far may weaken the spring in the adjusting mechanism.

As soon as the lag meters are zeroed, the plotting room is notified to turn on the power for the data transmission system. When the indicator-regulator electrical dials are positioned, the gun is traversed and elevated manually to match the pointers. In order to put the gun in manual operation for either elevating or traversing, the corresponding transfer valve (2, fig. 6) must be pulled out, the handwheel moved toward the breech, and the manual cut-out switch (9, fig. 5) moved to the manual position. This manual cut-out switch is located under the cover on the right side of the indicator-regulator. When moving this cut-out switch from AUTOMATIC to MANUAL, it is necessary to make a 5-second pause at the mid-position. The manual cut-out switch is shown in the mid-position in 9, figure 5. The reason for this pause is to prevent dangerously high current from flowing in the fine repeater rotor. As the cut-out switch is moved from AUTOMATIC to mid-position, the fine dial (7, fig. 5) should be watched closely. If the dial pointer starts to whirl, the switch should be moved quickly back to AUTOMATIC. If this is not done quickly, the instrument will be damaged. When the fine

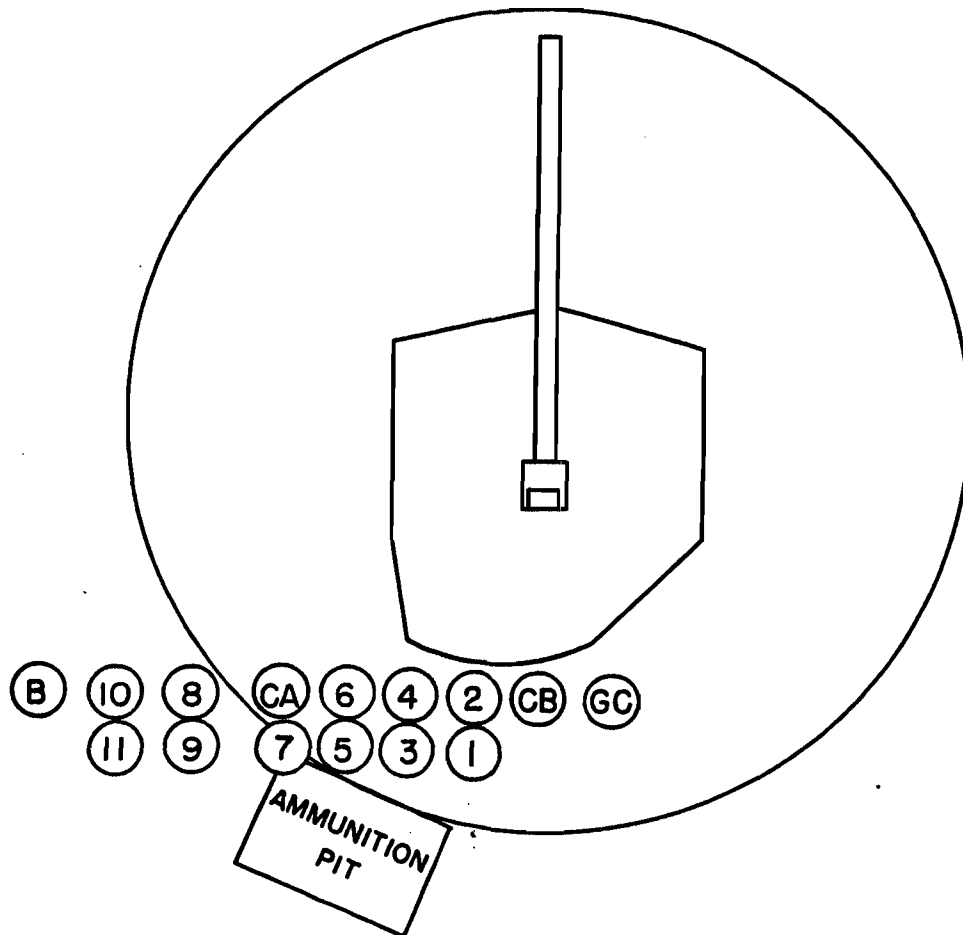


FIGURE 3.—Formation of gun section.

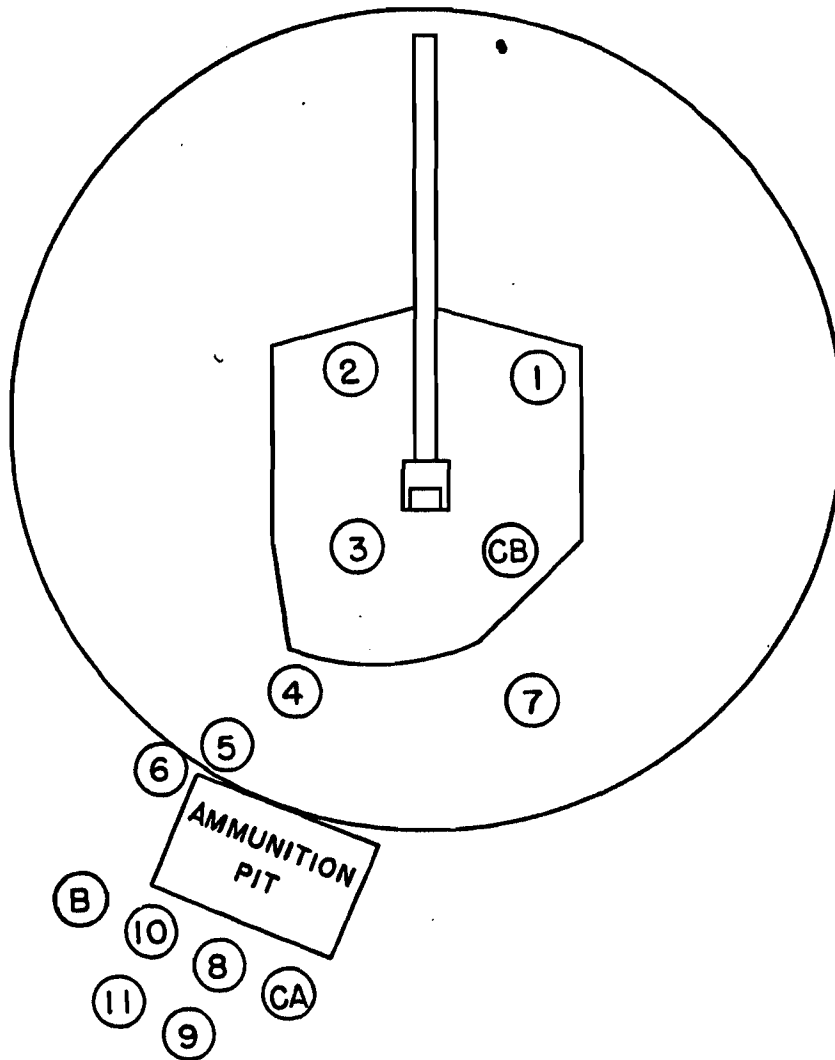


FIGURE 4.—Positions at command DETAILS, POSTS.

dial has stopped rotating, another attempt to switch from AUTOMATIC to MANUAL can be made. When moving the cut-out switch in the opposite direction, that is from MANUAL to AUTOMATIC, it is not necessary to make the 5-second pause but it is desirable and should be practiced. After the cut-out switch is in the manual position, the next step is to match the pointers exactly by manually turning the handwheels. After the dial pointers are matched, note the position of the lag meter pointers. If the lag meter pointers are not zeroed when the dial pointers are matched exactly, the corresponding synchrotransformer must be adjusted. The synchrotransformer adjusting shaft is located under the cover on the left side of the indicator-regulator (2, fig. 5). The adjustment is made by turning the screw in the proper direction. When these adjustments are accomplished and oil level checked in the A-end housing of remote control system, all personnel are notified to stand clear of the gun. The gun pointer then turns on the power switch to the oil motor. The switch for this motor is located in the gun junction box on the left side of the gun (1, fig. 6). After the motor is started, it must be ascertained whether the oil motor is functioning properly. Any unusual noise other than the operating hum of the motor indicates that it is not functioning properly. It should be stopped immediately and the trouble ascertained. With the motor operating, both No. 1 and No. 2 check to see that the pointers are approximately matched before moving their respective manual cut-out switches to AUTOMATIC. With all personnel standing clear, the handwheels are moved toward the muzzle of the gun and the transfer valves pushed in. The position of the lag meter indicators is next noted. If they are not at zero, it is an indication that the amplifier is not properly adjusted. Adjustment is made at the amplifier box (2, fig. 7) by moving the proper slotted shaft, marked AS or EL, until the corresponding lag meter is zeroed. When this adjustment is complete, the entire adjustment procedure outlined in this paragraph should be repeated as a check.

(2) *Duties of the chief of breech and No. 3 (the loader).*—The chief of breech is in charge of the breech and No. 3 assists him. First the breech is opened and its operation checked. The chief of breech examines the bore and powder chamber of the gun. If they need cleaning, he immediately reports this fact to the gun commander. When he is satisfied that the bore and powder chamber are clean, he checks the operation of the breech mechanism. He has one of the ammunition relayers bring up a round or an empty cartridge. Using the base of the cartridge, the breech is closed by pressing the

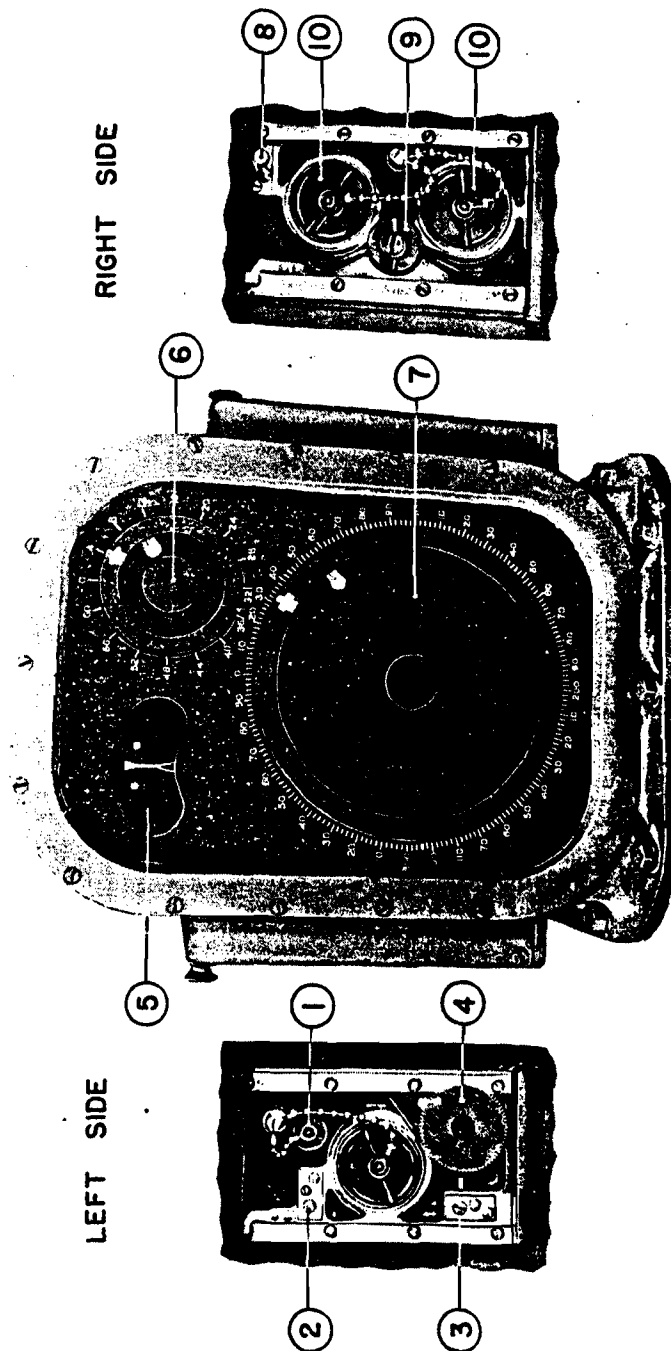


FIGURE 5.—Indicator-regulator.

- | | |
|---------------------------------------|------------------------------------|
| 1. Lag meter adjusting shaft cover | 6. Coarse repeater |
| 2. Synchrotransformer adjusting shaft | 7. Fine repeater |
| 3. Fine repeater adjusting shaft | 8. Coarse repeater adjusting shaft |
| 4. Orientation adjustment ratchet | 9. Fine repeater cut-out switch |
| 5. Lag meter | 10. Lamp cover |

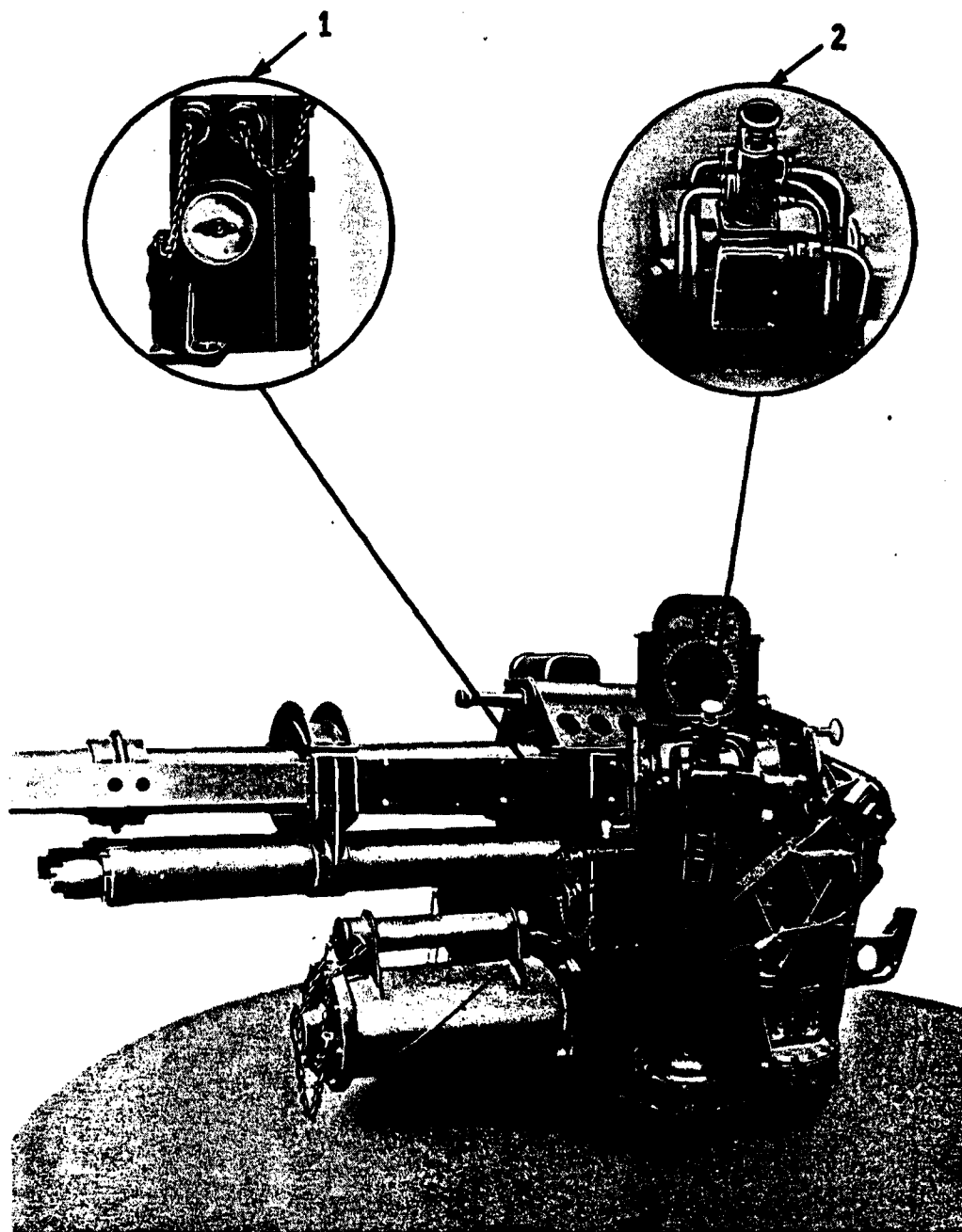


FIGURE 6.—90-mm gun, left side.

1. Gun junction box

2. Transfer valve

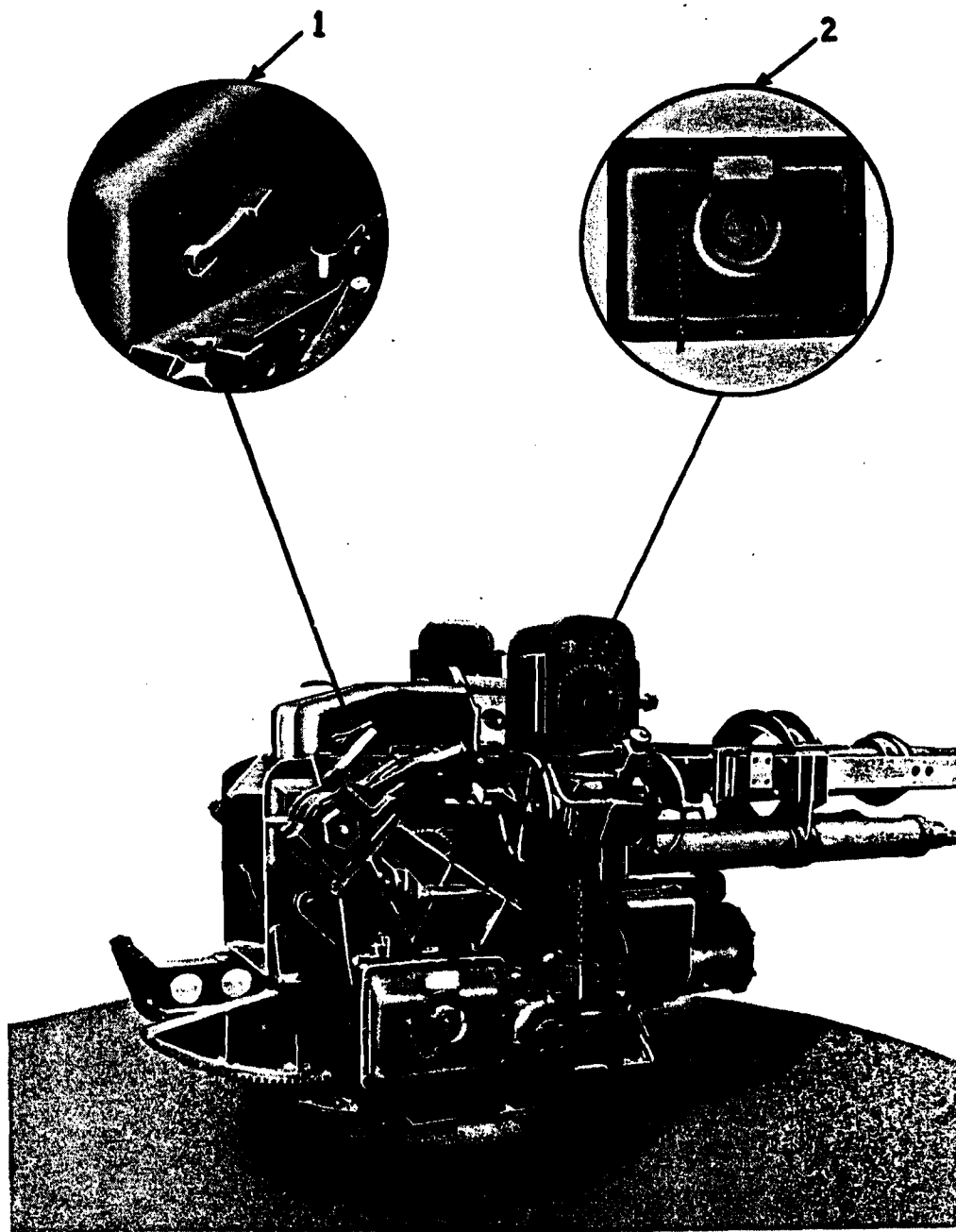


FIGURE 7.—90-mm gun, right side.

1. Cocking lever

2. Amplifier

base against the extractors (see fig. 8). A firm grip on the round should be maintained because the upward movement of the breech tends to throw it into the air. The breech can be closed only in this manner when not inserting a round into the chamber.

CAUTION: The breech should NOT be closed by pushing in on the extractors with the fingers. This is dangerous and may result in injury to the hand.

With the breech closed and the chamber of the gun empty, the chief of breech next tests the firing mechanism. The firing pin may be cocked, either by opening the breech or pressing down on the cocking lever, which is located on the right side of the breech ring. (See 1, fig. 7.)

d. Report.—At the command **REPORT**, No. 1, No. 2, the chief of breech, and the chief of ammunition report in turn any defects that cannot be remedied or, if no defects exist, they report as follows:

“Elevation in order.”

“Traversing in order.”

“Breech in order.”

“Ammunition in order.”

e. Target.—At the command **TARGET**:

(1) *Duties of the ammunition squad.*—If the gun section is preparing for drill, the ammunition squad brings out the dummy rounds. If service ammunition is to be fired, the pit is opened and the caps removed from the fiber containers. Sufficient ammunition should be kept on hand in the pit or adjacent thereto for two minutes of firing.

(2) *Case II pointing.*—The gun commander repeats the assignment of target and relays No. 2's report, “On target,” to the battery executive after he is sure that the proper target is being tracked. No. 1 sets the gun in elevation manually or sets the gun in remote control operation as soon as data are being received. The chief of breech opens the breech by pulling back and down on the breech-operating lever. He immediately returns the breech-operating handle to the locked position. No. 3 makes sure that the breech-operating cam lever is set to **AUTOMATIC** unless otherwise ordered. The ammunition detail and relay men, grasping the ammunition in the palms of both hands and keeping the projectile end of the round always forward, begin passing the ammunition to No. 3. No. 3 receives the round on the palms of both hands with the left hand near

the projectile (see fig. 9) and moves the projectile over the top of the breech, placing the projectile on the breechblock ready to be rammed into the chamber of the gun. The chief of breech with clenched fist places his left hand so that the thumb and first finger press against the base of the cartridge and rams the round into the chamber. (See fig. 10.) As the round approaches home, the breechblock is tripped and rises to close, knocking his hand out of the way. He may find that it helps him if he rests his right hand on the right trunnion of the gun. After the breech is closed he steps back with his right foot.

(3) *Case III pointing.*—The gun commander repeats the command TARGET but does not repeat the assignment of target. Both No. 1 and No. 2 commence tracking manually or set the gun in remote control operation as soon as data are available. All others proceed as is explained in (2) above.

f. *Commence firing.*—At the command COMMENCE FIRING, the gun commander repeats the command. The chief of breech pulls the firing lever with his right hand. Following rounds are fired without command. The only steps the chief of breech makes are to step forward with his right foot to load the projectile and then to step backward with his right foot before firing the gun. He holds his left foot in place. Movements of No. 3 are quite similar. He keeps his right foot in place and moves the left first backward on line with his right foot to receive a round from the ammunition relay and then forward to place the round in the breech. Members of the ammunition squad and the relayers pass the rounds to No. 3 from outside the shielded enclosure. As a safety precaution the men on the ammunition squad must be instructed to stand clear of the breech when the cartridges are ejected from the gun. As the empty cartridges are ejected from the gun, No. 7 (the empty cartridge handler) kicks the side of the cartridge as it bounces on the concrete with the inside of his right foot and knocks the cartridge off the concrete apron.

g. *Suspend firing.*—At the command SUSPEND FIRING, the chief of breech immediately ceases firing the gun. If a round is in the chamber it will be left there. If a round is about to be loaded the details of loading are completed as under the command TARGET. The gun commander will repeat any new assignment of target to No. 2 if case II pointing is being used and relay the report, "On target," to the battery executive. The gun commander will repeat the command RESUME FIRING when received and the chief of breech pulls the firing lever.

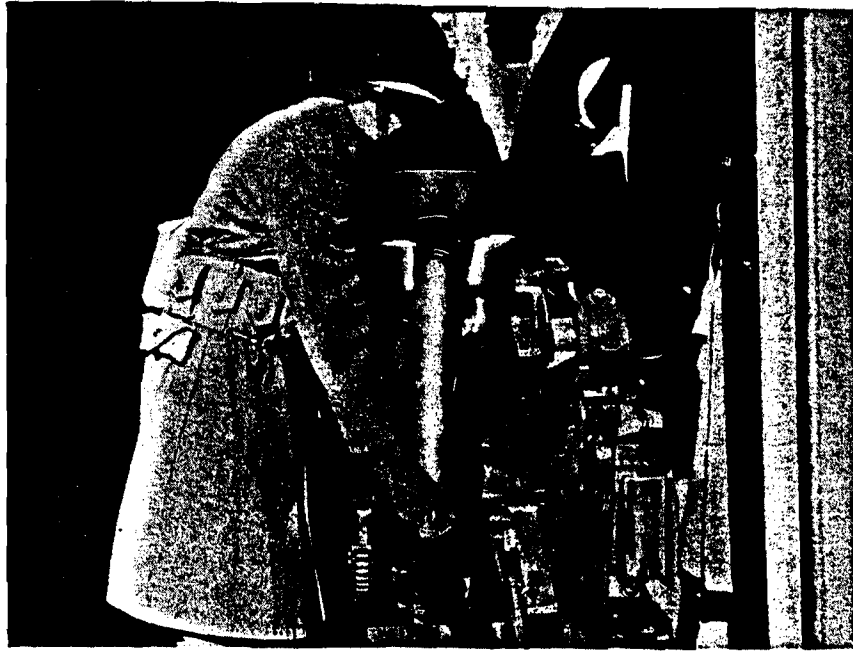


FIGURE 8.—Closing breech with chamber empty.



FIGURE 9.—Passing ammunition to No. 3.

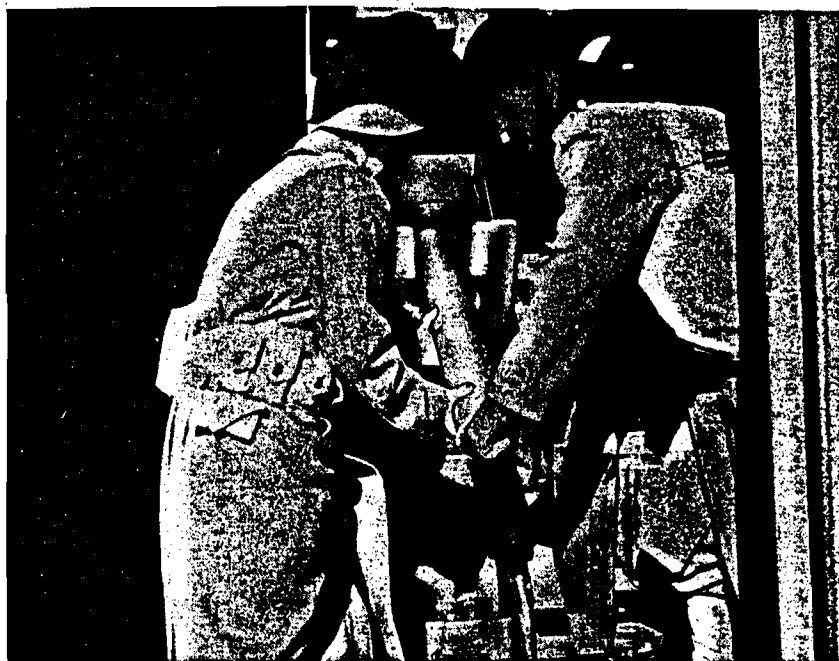


FIGURE 10.—Chief of breech loading the round.

h. Cease firing.—At the command **CEASE FIRING**, the chief of breech unloads the gun, if loaded, as soon as No. 3 is ready to receive the round. After No. 3 has passed the round to the ammunition squad, the chief of breech and No. 3 wipe off the breech mechanism parts and oil them, remaining at all times at their posts. No. 1 and No. 2 pull out their respective transfer valves, turn indicator switches to **MANUAL**, engage the handwheels, turn off motor switch, and remain at their posts. Members of the ammunition squad replenish the ammunition supply at the pit and remain at their posts unless otherwise directed.

i. Replace equipment.—At the command **REPLACE EQUIPMENT**, the dummy rounds and other equipment are returned to the emplacement. If action has taken place, the ammunition pit is again filled and the empty cartridges are removed and stored in the emplacement. After each firing the gun commander should supervise the cleaning of the bore and chamber and should detail two men to assist the chief of breech and No. 3 in the cleaning and oiling of the breech mechanism. The breech and muzzle covers should be replaced and the emplacement, including the area around the guns and ammunition pits, policed.

10. DUMMY DRILL.—Dummy drill is conducted under conditions approximating those of the standard drill. The only duties changed are those of the chief of breech and the ammunition relayers. The chief of breech must operate the breech manually. In this case, he opens the breech by moving the breech-operating handle back and down until the extractors lock the breech open. If there is a dummy round in the chamber, he must be sure before opening the breech that an ammunition relayer is ready to catch the extracted round. After the breech is open, the operating handle is returned immediately and locked in the upward position. The ammunition relayer who catches the extracted dummy round stands at the right rear of the breech inside the shielded enclosure. He catches the extracted round with the left hand over the base of the cartridge and the right hand near the projectile. The round is then passed around through the waiting ammunition relayers, positioned as shown in figure 11, and returned to No. 3. The position of the ammunition relayers should be alternated so that all of them get practice serving ammunition to No. 3.

SECTION V

SAFETY PRECAUTIONS

11. GENERAL.—a. Safety precautions to be observed in time of peace are prescribed in FM 4-20 and AR 750-10.

b. The more important safety precautions pertaining to the gun section are described in this section.

12. AMMUNITION.—All ammunition at the firing point must be so placed that it will be protected against explosion in case of an accident at the gun position. It should be in a dry place and protected from the direct rays of the sun by a tarpaulin or other covering. Erratic shots and dangerously high powder pressures may result from overheated ammunition.

13. MISFIRES.—a. A misfire is said to occur when the piece fails to discharge when an attempt to fire it has been made.

b. In case of a misfire, at least three attempts to fire will be made. The breechblock will not be opened until at least 2 minutes after the last attempt to fire the piece, and the gun will be kept pointed at the target or in a safe location in the field of fire.

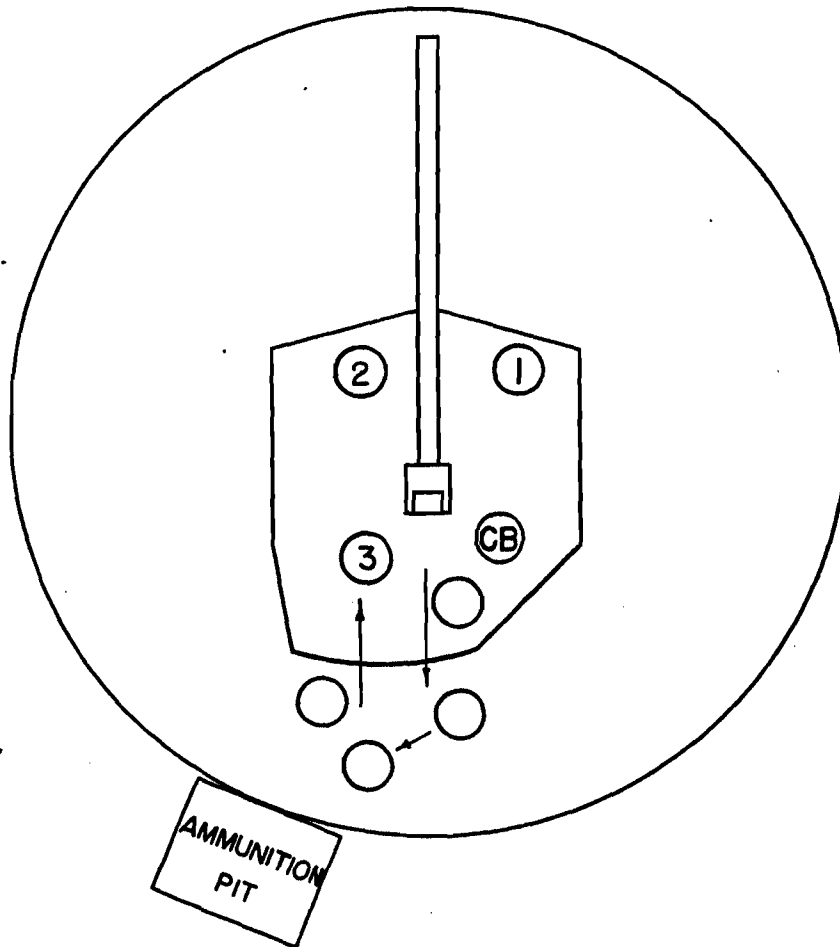


FIGURE 11.—Positions for dummy drill.

14. DRILL AND FIRING.—a. Members of the gun section will be trained always to pass in the rear of the gun and well clear of the breech in going from one side to the other.

b. The chief of breech will keep clear of the firing lever until the piece has been loaded and is ready to be fired. Extra care must be taken to prevent accidental contact with the firing lever during the loading operation. In addition, the chief of breech makes sure that he does not fire the piece until he has pivoted on his right foot away from the rear and to the side of the gun.

SECTION VI

DESTRUCTION OF MATERIEL

15. GENERAL PRINCIPLES.—a. Tactical situations may arise when, due to limitations of time or transportation, it will become impossible to evacuate all equipment. In such situations it is imperative that all materiel that cannot be evacuated be destroyed to prevent:

- (1) Its capture intact by the enemy.
- (2) Its use by the enemy, if captured, against our own or allied troops.
- (3) Its assembly by the enemy into complete units from salvaged parts.

b. The working principles to be followed are:

(1) Methods for the destruction of materiel subject to capture or abandonment in the combat zone must be adequate, uniform, and easily followed in the field.

(2) Destruction must be as complete as the available time, equipment, and personnel will permit. If thorough destruction of all parts cannot be completed, the parts essential to the operation or use of the materiel, particularly those which cannot be easily duplicated, should be destroyed or removed. *The same essential parts must be destroyed on all like units to prevent the enemy's constructing one complete unit from several damaged ones by "cannibalization."*

(3) The destruction of materiel subject to capture or abandonment *will be undertaken only when ordered by the harbor defense or higher commander.*

c. To accomplish adequate and uniform destruction of materiel, it is essential that:

(1) All echelons prepare plans for the destruction of materiel in the event of imminent capture. Such plans must be flexible enough to make allowance for variations in available time, equipment, and personnel.

(2) All echelons be trained to effect the desired destruction of materiel issued to them. *Training will not involve the actual destruction of materiel.*

d. Certain of the methods outlined require special tools and materials, such as TNT and incendiary grenades, which normally may not be items of issue. The issue of such special tools and materials, the materiel for which issued, and the conditions under which destruction will be effected *are command decisions in each case*, according to the tactical situation.

16. PRIORITY OF DESTRUCTION.—a. Destruction should be accomplished in the following priority:

- (1) Tube, breech, and recoil mechanism.
- (2) Power equipment.
- (3) Carriage.
- (4) Sights and observation instruments.
- (5) Plotting room equipment.
- (6) Ammunition.
- (7) Fire control and observation stations; ammunition magazines.

b. In the event of imminent capture, everything that could be of possible use to the enemy should be destroyed. If evacuation is probable, all sights, optical instruments, and other valuable small items should be evacuated.

17. TUBE.—a. General.—The selection of a method of demolition will depend on the tactical situation and the materials available. The methods for the destruction of the tube are presented in the order of their effectiveness.

b. Demolition by unfuzed HE shell and either M9A1 AT grenade or M6 AT rocket.—Remove the recoil cylinder filling and vent plugs and elevate the gun slightly to allow the recoil oil to drain. It is not necessary to wait for the reserve oil to drain completely before firing the piece. Lay an armed (*safety pin removed*) M9A1 AT grenade, HE, or M6 AT rocket in the tube about six inches in front of an unfuzed, boosted, HE shell (see fig. 12). Fire the gun using a lanyard at least 100 feet long. The person firing the piece should

be under cover in the rear of the piece and about 20 degrees off the line of fire. When using this method, the danger zone is about 500 yards in radius.

c. *Demolition by TNT blocks.*—Insert 6 to 8 one-half pound TNT blocks in the chamber of the gun and 3 or 4 additional one-half pound blocks in the bore of the gun near the muzzle (see fig. 13). Close the breechblock. Plug the muzzle end of the tube tightly with earth to a distance of approximately 10 inches from the muzzle. Detonate the TNT charges simultaneously. The firer should be under cover. The danger zone is about 500 yards. For instructions on the wiring and firing of TNT, see FM 5-25.

d. *Demolition by incendiary grenades.*—If evacuation is imminent and it is desired to accomplish demolition without tell-tale explosions, the following method should be used: Place 4 unfuzed M14 incendiary grenades end to end midway in the tube at 0° elevation. Close the breech. Equip another incendiary grenade with a 15-second Bickford fuze, ignite it, and throw it in the muzzle. The metal from the grenades will fuse with the tube and fill the grooves (see fig. 14).

e. *Demolition by firing guns at each other.*—Fire one gun at another at point-blank range. Two or more hits on a vital spot such as the breech mechanism, recoil mechanism, or tube should adequately destroy a gun. Fire from cover. The danger space is from 200 to 500 yards. Destroy the last gun and carriage by the best means available. Heavy sledge hammer blows will destroy the remote control system, breechblock, and firing mechanism. If the gun is close enough to deep water all parts which can be removed easily should be thrown in. Danger from "cannibalization" is inherent in this method.

18. **BREECH.**—Any of the above methods for destroying the tube should also destroy the breech; but if the method selected does not, a heavy sledge may be used to render the breech useless.

19. **RECOIL MECHANISM.**—a. If the methods explained in the above paragraphs are used to destroy the tube and breech, the carriage and recoil mechanism should be adequately destroyed.

b. No other hasty method of destroying the recoil mechanism has been proposed.

20. **POWER EQUIPMENT.**—All auxiliary power equipment should be rendered useless. Electric motors and generators can most effectively and easily be put out of operation by injuring the field or armature windings. If time is available, the motor shell may be broken with a sledge and the coils ruined with a crowbar. If time is short, a small arms bullet may easily be directed into the coils through the air vents in either end bell, but care should be taken to see that nobody is in the path of a possible ricochet. Switch panels, plugs, and fuse or circuit-breaker panels should be smashed with a sledge or ax.

21. **TELESCOPES AND OBSERVATION INSTRUMENTS.**—Telescopes and observation instruments should be evacuated if possible. If they cannot be carried away, they should be smashed thoroughly.

22. **PLOTTING ROOM EQUIPMENT.**—All boards and instruments should be smashed and burned if possible. Data transmitters and all communication equipment should be smashed.

23. **AMMUNITION.**—Demolition of the ammunition stored at the battery can best be carried out by burning; however, sufficient inflammable material must be available to make a good fire. All inflammable material is placed on or around the ammunition pile and sufficient gasoline put on the pile to create a hot fire. If the ammunition is not packed in boxes, additional inflammable material and gasoline will be needed for complete destruction.

24. **FIRE CONTROL AND OBSERVATION STATIONS; AMMUNITION MAGAZINES.**—*a.* These installations can best be destroyed by demolition with TNT.

b. See FM 5-25 for details of demolition planning and execution.

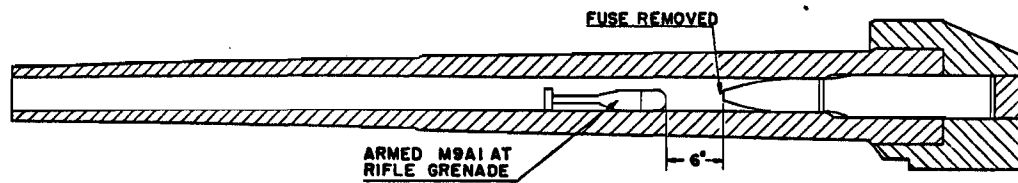


FIGURE 12.—Demolition by means of M9A1 antitank rifle grenade.

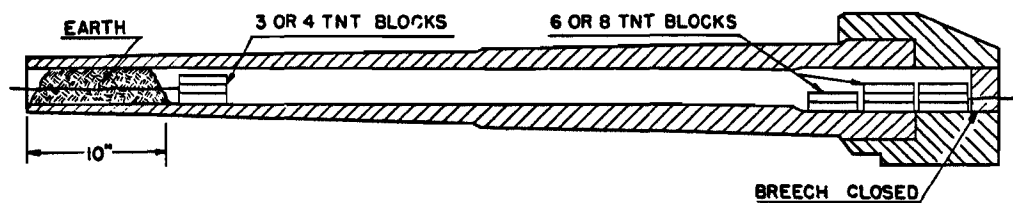


FIGURE 13.—Demolition by means of TNT blocks.

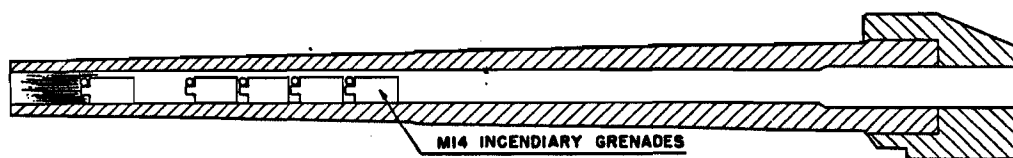


FIGURE 14.—Demolition by means of M14 incendiary grenades.

SECTION VII

DRILL TABLE

Service of the piece, 90-mm gun, fixed mount

Details	DETAILS, POSTS	TARGET
Chief of breech	Checks availability of cotton waste and can of oil. Assisted by No. 3, removes breech cover and places it in designated spot. Takes post at right rear of gun, opposite and facing breech.	Opens breech by bearing down on breech-operating handle until breech-block is locked open; immediately latches operating handle. Assumes position, feet well braced, clear of recoil but convenient for loading by hand. When No. 3 places round in loading position rams round into chamber.
No. 1 (Elevation setter)	Takes post at elevation station facing elevation indicator-regulator.	(a) Matches pointers approximately. Opens cover on right side of indicator-regulator, turns switch to AUTO-MATIC. Disengages handwheels by sliding them toward muzzle of gun. Pushes in transfer valve. Watches lag meter pointer which indicates whether or not remote control system is operating properly. (b) Manual operation. Raises transfer valve, turns indicator-regulator switch to MANUAL, stopping at intermediate position for 5 seconds, engages handwheels, and matches pointers. To prevent damage to the instrument the 5-second stop must be made.
No. 2 (Gun pointer)	Takes post at azimuth station facing azimuth indicator-regulator.	If case II pointing is used, sets traversing mechanism for manual operation, gets on target with telescope and reports, "On target." If case III pointing is to be used with automatic operation, turns motor switch at gun junction box to ON, opens cover on side of indicator-regulator, turns switch to AUTOMATIC. Disengages handwheels by sliding them toward muzzle of the gun. Pushes in transfer valve. Watches lag meter pointer which indicates whether or not remote control system is operating properly. If case III pointing is to be used with manual operation, raises transfer valve, turns indicator-regulator switch to MANUAL, stopping at intermediate position for 5 seconds, engages handwheels, and matches pointers.

SECTION VII

DRILL TABLE

Service of the piece, 90-mm gun, fixed mount

COMMENCE FIRING	SUSPEND FIRING	CEASE FIRING
Fires gun. Rams next round into chamber. When his fist is knocked clear by rising breechblock, he steps back with his right foot and repeats firing gun.	Ceases to fire gun. If round is in chamber prepares to fire round on command RESUME FIRING. If chamber is empty loads next round into chamber.	Discontinues firing. If unfired round is in gun unloads as soon as No. 3 is ready to receive round. Wipes off breech mechanism parts. Remains at post at all times.
Continues to watch lag meter pointer or, if operating gun manually, continues matching pointers.	Continues to track target.	When operating automatically pulls out transfer valve. Turns indicator-regulator switch to MANUAL, stopping at intermediate position for 5 seconds. Engages handwheels. Remains at post.
In case II pointing continues tracking target and setting deflections. In case III pointing continues to watch lag meter pointer or, if operating gun manually, continues matching pointers.	Continues tracking target or, in case II firing, changes target when so instructed and reports when on target.	Pulls out transfer valve. Turns indicator-regulator switch to MANUAL, stopping at intermediate position for 5 seconds. Engages handwheel. Turns off motor switch. Remains at post.

Section VII—Continued

DRILL TABLE

Service of the piece, 90-mm gun, fixed mount

Details	DETAILS, POSTS	TARGET
No. 3 (Loader)	Assists chief of breech to remove breech cover and place it in designated spot. Takes post at left rear of gun, opposite and facing breech.	Takes position, feet well braced and clear of the recoil, facing the breech. Receives the round on the palms of both hands and steps forward with left foot and passes projectile over breech, placing round on breechblock to be loaded by chief of breech.
Nos. 4, 5, and 6. (Ammunition relayers)	Take post forming line between the ammunition pit and No. 3.	Pass ammunition forward until No. 3 and each man has a round. *
No. 7 (Empty cartridge handler)	Takes position outside the shield to the right of the opening facing toward and parallel to the opening.	No duties.
Nos. 8 to 11 (Ammunition squad)	Take positions behind ammunition pit.	Under direction of chief of ammunition, open ammunition pit and remove container caps. Make sure all rounds are loose in their cases. Supply ammunition to No. 3 and the ammunition relay men.

* Care should be taken that the head of the fuze is not struck by either the breech in recoil or the ejected empty cartridge.

SECTION VII—Continued

DRILL TABLE

Service of the piece, 90-mm gun, fixed mount

COMMENCE FIRING	SUSPEND FIRING	CEASE FIRING
After the gun is fired, places the next round in position for ramming. Pivots backward each time to receive another round and continues this until the command <i>SUSPEND FIRING</i> or <i>CEASE FIRING</i> is ordered.	Holds next round ready to be loaded. If unfired round is in gun, stands clear of the recoil. If chamber is empty places round on the breechblock to be rammed into the chamber.	If an unfired round is in the gun, places right palm fingers down, behind breechblock and, at signal of chief of breech, catches ejected round and passes it to the ammunition detail. Remains at post.
Start service of ammunition.	Pass ammunition on forward until each man has a round.	Return all unfired rounds to the ammunition pit and assist ammunition squad.
Kicks the empty cartridges ejected from the gun as they bounce out of the shield with the inside of his right foot, knocking them off the concrete apron.	Removes any empty cartridges which might be in the way. Takes post and prepares to continue performing duties.	Removes all empty cartridges and assists in their storage. Assists the ammunition squad.
Start service of ammunition to re-layers.	Pass ammunition forward until each man has a round. Prepare additional ammunition in the pit if necessary and make ready to pass additional ammunition to the loader.	After replenishing ammunition supply at ammunition pit and collecting empty cartridge cases, take posts unless otherwise directed.

This bulletin, Tentative Coast Artillery Field Manual, FM 4-01, was prepared and published at The Coast Artillery School with the approval of The Commanding General, Army Ground Forces. Comments from the field on the contents of the bulletin are solicited. Additional copies will be forwarded upon request.

